Unit: Bonding	
IB Expectations/ Assessment Criteria	
DP Group 4:Chemistry, DP - Age 16-18, Aims All the Diploma Programme experimental science courses should aim to: ▪ 1. provide opportunities for scientific study and creativity within a global context that will stimulate and challenge students ▪ 2. provide a body of knowledge, methods and techniques that characterize science and technology ▪ 3. enable students to apply and use a body of knowledge, methods and techniques that characterize science and technology ▪ 4. develop an ability to analyse, evaluate and synthesize scientific information ▪ 5. engender an awareness of the need for, and the value of, effective collaboration and communication during scientific activities ▪ 6. develop experimental and investigative scientific skills ▪ 7. develop and apply the students' information and communication technology skills in the study of science ▪ 8. raise awareness of the moral, ethical, social, economic and environmental implications of using science and technology ▪ 9. develop an appreciation of the possibilities and limitations associated with science and scientists ▪ 10. encourage an understanding of the relationships between scientific disciplines and the overarching nature of the scientific method.	
Approach	**Significant concept(s) / Considerations**
Project based learning of bonding.	Ionic and Covalent bonding Intermolecular forces and metallic bonds.
Guiding Questions	**Learner Profile**
Why do atoms bind?	▪ Inquirers ▪ Communicators ▪ Open-minded ▪ Balanced ▪ Reflective
Central Idea / Content	**Learning Objectives**
4.1 Ionic bonding 4.2 Covalent bonding	Describe the ionic bond as the electrostatic attraction between oppositely charged ions.

4.3 Intermolecular forces 4.4 Metallic bonding 4.5 Physical properties 14.1 Shapes of molecules and ions 14.2 Hybridization 14.3 Delocalization of electrons	How ions can be formed as a result of electron transfer. Which ions will be formed when elements in groups 1, 2 and 3 lose electrons? Which ions will be formed when elements in groups 5, 6 and 7 gain electrons? State transition elements can form more than one ion. Predict whether a compound of two elements would be ionic from the position of the elements in the periodic table or from their electronegativity values. State the formula of common polyatomic ions formed by nonmetals in periods 2 and 3. Describe the lattice structure of ionic compounds. Describe the covalent bond as the electrostatic attraction between a pair of electrons and positively charged nuclei. Describe how the covalent bond is formed as a result of electron sharing. Deduce the Lewis (electron dot) structures of molecules and ions for up to four electron pairs on each atom. State and explain the relationship between the number of bonds, bond length and bond strength. Predict whether a compound of two elements would be covalent from the position of the elements in the periodic table or from their electronegativity values. Predict the relative polarity of bonds from electronegativity values Predict the shape and bond angles for species with four, three and two negative charge centres on the central atom using the valence shell electron pair repulsion theory (VSEPR). Predict whether or not a molecule is polar from its molecular shape and bond polarities. The structure and bonding in the three allotropes of carbon (diamond, graphite and C**60**fullerene). Describe the structure of and bonding in silicon and silicon dioxide.

	Describe the types of intermolecular forces (attractions between molecules that have temporary dipoles, permanent dipoles or hydrogen bonding) and explain how they arise from the structural features of molecules. Describe and explain how intermolecular forces affect the boiling points of substances. Describe the metallic bond as the electrostatic attraction between a lattice of positive ions and delocalized electrons. Explain the electrical conductivity and malleability of metals. Compare and explain the properties of substances resulting from different types of bonding. AHL Predict the shape and bond angles for species with five and six negative charge centres using the VSEPR theory. Describe σ and π bonds. Explain hybridization in terms of the mixing of atomic orbitals to form new orbitals for bonding. Identify and explain the relationships between Lewis structures, molecular shapes and types of hybridization (sp, sp**2** and sp**3**). Describe the delocalization of π electrons and explain how this can account for the structures of some species.

Assessment

Worksheets/Assignments
Summative: Other Written Assessment
Worksheets to assess students' learning on a daily basis.

Quizzes and a unit Test.
Summative: Standardized Test

Quizzes on a regular basis and a unit test.

Labs
Summative: Lab Assignment
Students start with the first design lab.

Information Literacy & ICT	International Mindedness	TOK
Project based on ICT.	All combinations and permutations are possible with atomic bonding. Is this possible with people across borders of politics, race, religion, etc.	

Strategies / Activities / Differentiation	Resources
An easier level project for students with ICT difficulties.	Chemistry Course Companion Teacher assisted learning materials Independent research instuments Worksheets.

Unit Reflections